

Appl. No. 09/927,712  
Amdt. sent February 14, 2006  
Preliminary Amendment

PATENT

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings of claims in the application:

**Listing of Claims:**

1-16. (Canceled)

17. (Currently amended) A computer system comprising:

a front-end server connected to a network and adapted to receive requests from one or more client computers;

a first back-end server connected to said front-end server and said client computers via said network and operative to receive I/O requests from said front-end server;

a second back-end server connected to said front-end server and said client computers via said network and operative to receive I/O requests from said front-end server;

a first plurality of storage units initially accessible by said first back-end server and not accessible by said second back-end server;

a second plurality of storage units initially accessible by said second back-end server and not accessible by said first back-end server;

a managing computer in data communication with said front-end server and said back-end servers via said network, said managing computer operative to obtain data access load conditions at each storage unit from said front-end server;

a storage system, said storage system comprising said first plurality of storage units and said second plurality of storage units, wherein a communication port in said first back-end server and a communication port in said second back-end server can be configured for data communication with communication ports in said storage system; and

a switch operative for data communication among devices connected to said switch, said first back-end server and said second back-end server being connected to said switch, said storage system being connected to said switch so that said first and second back-end servers can access data stored in said first and second plurality of storage units, said switch

Appl. No. 09/927,712  
Amdt. sent February 14, 2006  
Preliminary Amendment

PATENT

23 further being operative to direct data requests from one of said first and second back-end servers  
24 to a specified storage unit in said storage system.

25 wherein, based on said data access load conditions, including a condition in that a  
26 load at a source storage unit in said first plurality of storage units exceeds a predetermined  
27 amount, said managing computer operative to:

28 select a destination storage unit in said second plurality of storage units;  
29 copy a first data partition from said source storage unit to said destination  
30 storage unit and subsequently delete said first data partition from said source storage unit;  
31 grant said first back-end server access to said destination storage unit; and  
32 transmit information to said front-end server that said first data partition is  
33 to be accessed by said first back-end server via said destination storage unit.

18-20. (Canceled)

1 21. (Previously presented) The system of claim 20, further comprising a  
2 second storage system including a third plurality of storage units, wherein communication ports  
3 in said second storage system can be configured for data communication with communication  
4 ports in said first back-end server and said second back-end server.

1 22. (Previously presented) The system of claim 17 wherein additional data  
2 partitions in said source storage unit can be similarly moved to additional storage units, said first  
3 back-end server being granted access to said additional storage units, said front-end server being  
4 informed that said additional data partitions are to be accessed on said additional storage units.

23 and 24. (Canceled)

Appl. No. 09/927,712  
Amdt. sent February 14, 2006  
Preliminary Amendment

PATENT

1                   25. (Previously presented) The system of claim 17 wherein said management  
2 computer includes a display unit operable to present a first display area and a second display  
3 area,

4                   said first display area to display one or more first symbols that represent said first  
5 back-end server, said second back-end server, or any of said first plurality of storage units, and  
6 having second symbols that represent communication paths,

7                   said second display area having third symbols that represent any of said second  
8 plurality of storage units,

9                   wherein said management computer selects the destination storage unit in  
10 accordance with receiving an indication for moving one of said third symbols from said second  
11 display area into said first display area.

1                   26. (Currently amended) A computer system comprising:  
2 a first server operative to receive I/O requests from a requesting computer;  
3 a second server;  
4 a managing computer in data communication with said first server; and  
5 a first storage system comprising a plurality of storage units;  
6 a second storage system comprising a plurality of storage units; and  
7 a switch operative for data communication among devices connected to said  
8 switch, said first server and said second server being connected to said switch, said first and  
9 storage systems being connected to said switch so that said first and second servers can access  
10 data stored in said storage units thereof, said switch further being operative to direct data  
11 requests from one of said first and second to a specified storage unit in said first and second  
12 storage systems,

13                   wherein a communication port in said first server and a communication port in  
14 said second server can be configured for data communication with communication ports in said  
15 first and second storage systems respectively,

16                   said first server in data communication with a first storage unit in said first storage  
17 system,

Appl. No. 09/927,712  
Amdt. sent February 14, 2006  
Preliminary Amendment

PATENT

18                   said managing computer operative to obtain loading information relating to data  
19   access load conditions of said first server,  
20                   based on said data access load conditions, including a condition in that a load of  
21   said first server exceeds a predetermined amount, said managing computer operative to:  
22                   select a second storage unit from either said first storage system or said  
23   second storage system;  
24                   perform a move operation of a first data partition stored in said first  
25   storage unit to said second storage unit and subsequently delete said first data partition  
26   from said first storage unit;  
27                   perform a first configuration operation granting said first server access to  
28   said second storage unit; and  
29                   transmit information to said requesting computer that said first data  
30   partition is to be accessed by said first server on said second storage unit.

27.   (Canceled)

1                   28.   (Currently amended) The system of claim 26 wherein the managing  
2   computer is further operative to perform a second configuration operation wherein ~~a~~ said second  
3   server is granted access to said first data partition on said second storage unit, if said first  
4   configuration operation cannot be performed, and wherein information is transmitted to said  
5   requesting computer that said first data partition is to be accessed by said second server on said  
6   second storage unit.

1                   29.   (Previously presented) The system of claim 28 wherein said requesting  
2   computer is a front-end server that receives requests from client machines, said first server and  
3   second server each being a back-end server which receives requests from said front-end server.

1                   30.   (Previously presented) The system of claim 26 wherein said first storage  
2   unit stores a plurality of data partitions, said first data partition being one of said data partitions,  
3   wherein said managing computer is further operative to move additional data partitions from

Appl. No. 09/927,712  
Amdt. sent February 14, 2006  
Preliminary Amendment

PATENT

4 among said plurality of data partitions to additional storage units based on data access load  
5 conditions obtained from said first server.

1 31. (Currently amended) The system of claim 26 ~~further comprising a~~  
2 ~~switching device, said first server in data communication with said switching device, wherein~~  
3 ~~said managing computer is~~ further being operative to obtain loading information from said first  
4 server or said switching device.

1 32. (Previously presented) The system of claim 26 wherein said management  
2 computer includes a display unit operable to present a first display area and a second display  
3 area,

4 said first display area to display one or more first elements representative of said  
5 first server, or said first storage unit, and second elements representative of communication paths  
6 among said first elements,

7 said second display area to display one or more third elements representative of  
8 said second storage unit,

9 wherein said management computer performs said first configuration operation in  
10 accordance with receiving an indication for moving one of said third elements from said second  
11 display area into said first display area.

1 33. (Currently amended) A computer system comprising:

2 a requesting computer including a front-end server for issuing an I/O request in  
3 response to a signal from a client computer;

4 a plurality of back-end servers, connected to the front end server through a  
5 network, for receiving the I/O request;

6 a storage device connected to the plurality of back-end servers through a  
7 connection port provided therein, including a plurality of disks for storing data to be processed in  
8 response to the I/O request received by at least one of the plurality of back-end server, said  
9 storage device comprising a first plurality of storage units and a second plurality of storage units,  
10 wherein a communication port in a first back-end server and a communication port in a second

Appl. No. 09/927,712  
Amdt. sent February 14, 2006  
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PATENT

11 back-end server can be configured for data communication with communication ports in said  
12 storage device; and  
13 a switch operative for data communication among devices connected to said  
14 switch, said first back-end server and said second back-end server being connected to said  
15 switch, said storage system being connected to said switch so that said first and second back-end  
16 servers can access data stored in said first and second plurality of storage units, said switch  
17 further being operative to direct data requests from one of said first and second back-end servers  
18 to a specified storage unit in said storage system; and  
19 a management computer connected to the requesting computer and the plurality of  
20 back-end servers through the network for monitoring load conditions of the plurality of back-end  
21 servers operating in response to the I/O request via the requesting computer;  
22 the management computer including a display unit showing two kinds of symbols,  
23 one of which shows the back-end server receiving the I/O request, the front-end server, or a first  
24 disk, the other of which is representative of connections among the back-end server, the front-  
25 end server and the first disk,  
26 the management computer monitoring load conditions at the ports, a part of data  
27 stored in any of the disks being controlled to be copied to another disk in response to a load in  
28 excess of a predetermined amount;  
29 wherein a part of data in a first disk processed by a first back-end server of the  
30 plurality of back-end servers is controlled to be copied to a second disk accessed by a second  
31 back-end server in case that a load of the first back-end server indicated by a number of I/O  
32 access for the first disk exceeds a predetermined value, and controlled to be deleted from the  
33 first disk, and  
34 wherein the first disk is not accessible by the second back-end server before the  
35 part of data stored by the first disk is copied to the second disk and deleted from the first disk,  
36 and wherein the part of data copied to the second disk is accessible by both the first and the  
37 second servers.

34-36 (Canceled)